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Should We Stay or Should We Go? Analyzing Continuance of Cloud Enterprise Systems

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Abstract:

As cloud computing has become a mature technology that companies across all industries have adopted, cloud service providers have increasingly begun to turn their attention to retaining their customers. However, little research has investigated the antecedents of service continuance in an organizational context. To address this gap in research, we carried out a quantitative empirical study. We developed a conceptual model that builds on previous research on organizational level continuance. We tested this model using survey data gathered from decision makers of companies that have adopted cloud enterprise systems. We analyzed the data using PLS. The results show that socio-organizational and technology-related factors can be used to predict continuance intention of cloud computing use. Besides cloud-specific findings, the study also enhances knowledge in organizational-level system continuance and its connection to IS success.

Keywords: Cloud Computing, Enterprise Systems, Organizational-level Analysis, Organizational Benefits, IS Success.

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1 Introduction

Employing corporate-wide systems, such as enterprise systems[1] (ES), represents one of the most significant developments of technology in businesses (Sedera & Gable, 2010). As such, a wealth of studies in information systems (IS) field focus on ES (Klaus, Rosemann, & Gable, 2000), implementation critical success factors (Nah, Zuckweiler, & Lau, 2003; Shaul & Tauber, 2013) and business benefits of ES (Anaya, Dulaimi, Abdallah, & Al-Mashari, 2015; Sedera, Lokuge, Grover, Sarker, & Sarker, 2016a). However, the findings of these studies are related to on-premise ES, and the on-premise ES that these papers considered require substantial initial resources to implement, dedicated personnel, and a long-term commitment to maintain (Salim, Sedera, Sawang, Alarifi, & Atapattu, 2015; Son, Lee, Lee, & Chang, 2014). The resource intensity in implementing and maintaining on-premise ES has made them suitable mainly for large, resourceful organizations.

However, with the advent of cloud computing, new business models have arisen through software as a service (SaaS) (Mell & Grance, 2010). As such, ES are now available as a service on a subscription basis (Lokuge & Sedera, 2016; Walther, Sedera, Sarker, & Eymann, 2013). The change from “on premise” to “on demand” is a substantial change. Some benefits with on-demand ES (i.e., cloud ES) include no infrastructure costs (Naous, Schwarz, & Legner, 2017), low hardware/software maintenance (Lokuge & Sedera, 2017), and minimal tech support (Lokuge & Sedera, 2016; Nylén & Holmström, 2015). Researchers argue that cloud ES reduce all IT expenses beyond the devices that connect to an organization’s ES (Hsu, Ray, & Li-Hsieh, 2014). Moreover, cloud ES are inherently ubiquitous (Hsu et al., 2014; Naous et al., 2017). Finally, the cloud service provider generally handles system upgrades or new releases, which means that the organization can focus on their core businesses (Lokuge & Sedera, 2014c). The subscription-based on-demand cloud ES allows organizations to treat the resources they need as operating expenses as opposed to treating them as capital expenditure (Booth, Mohr, & Peters, 2016). The aforementioned advantages of cloud ES have encouraged organizations with low resources, especially small and medium-sized enterprises (SMEs), to adopt ES (Elragal & Kommos, 2012). According to Fox et al. (2009), the low cost of adoption and low resource requirements for implementing and maintaining cloud ES have contributed to the strong growth in the number of organizations (especially SMEs) that adopt such systems (Forrest & Barthold, 2009). From conducting a study on corporate-wide system adoption, Gartner (Rayner, 2014) found that 47 percent of surveyed firms planned to move to cloud-based systems by 2020. However, cloud ES do not necessarily best suit small companies. From consumer goods companies such as Starbucks to financial service companies such as Allianz, more and more large companies are implementing cloud ES for specific lines of businesses, such as human resource management (e.g., SAP’s SuccessFactors) or customer relationship management (e.g., Salesforce.com) (Salleh, Teoh, & Chan, 2012). One can best express the economic importance of cloud ES in financial figures. The IDC has estimated that, by 2018, 27.8 percent of the worldwide enterprise applications market will be served on the cloud, which will generate US$50.8 billion in revenue up from US$22.6 billion or 16.6 percent of the market in 2013.

While the subscription model of cloud ES contributes to the growth of the overall market and makes it accessible for SMEs, a new set of challenges have emerged. We focus on one such challenge that the cloud ES *vendors* face in this paper. Unlike with on-premise ES that organizations must typically enter into long-term contracts for, organizations can terminate cloud ES with short notice. Several factors exacerbate the likelihood that an organization may discontinue a cloud-based ES: the low cost of switching between applications (Hsu et al., 2014), data-agnostic platforms and systems (Sedera, Lokuge, Salleh, Moghavvemi, & Palekar, 2016b), and a competitive market in general (Son et al., 2014). As such, the conceptualization of cloud ES changes from a decision about “continuance” rather than “adoption”.

Contribution:

Cloud-based enterprise systems (ES) have gained much prominence in the contemporary technology landscape given that they provide companies with the option of adopting ES through a subscription-based approach. However, we do not yet fully understand what factors would influence an organization to continue or discontinue their subscription. We evaluate five salient factors that organizations considers when deciding whether to continue or discontinue subscribing to cloud-based enterprise systems and demonstrate their relative effect on continuance.

[1] We follow Markus, Axline, Petrie, and Tanis (2003) to define ES as commercial software packages that enable organizations to integrate business processes and transaction-oriented data.

Thus, research on continuance of operational cloud-based ES has both a practical and an artifact-specific motivation. On the other hand, organizational-level continuance has also been an under-researched field vis-à-vis theory: continuance research has generally examined the level of individual users even though senior IS executives or others in the firm who may not be intense users of the system in questions typically make organizational [dis-]continuance decisions. A wide range of factors that likely have limited relevance to individual users can impact decisions that these executives make, such as the need to accommodate changes in strategic direction or the need to respond to pressures to reduce organizational costs (Furneaux & Wade, 2011). Therefore, to contribute to the empirical evidence of organizational-level continuance, we take a socio-technical approach. We validated our research model using a sample of senior decision makers reporting on their organizational and group properties concerning cloud-based ES. As such, we address the following research question (RQ):

RQ: What factors influence the organizational-level continuance of cloud ES?

To answer this question, we apply a quantitative empirical research design. As the question indicates, we specifically focus on the organization level. A basic element of observation, the unit of analysis refers to the "who" or "what" a researcher generalizes (Long, 2004). In this study, the organization serves as our unit of analysis, and we observe the organizational-level phenomenon using individuals who are responsible for cloud-based ES investment decisions in their organization (Long, 2004).

Our paper proceeds as follows. In Section 2, we review the literature and present the theoretical framework. In Section 3, we develop hypotheses. In Section 4, we describe our methods, including how we developed the measurement instrument and selected the method we used to analyze the data. In Section 5, we present the results of the quantitative assessment. Finally, in Section 6, we discuss our results and outline the study's implications, limitations, and contributions.

2 Literature Review

In this literature review, we: 1) define cloud ES and research on its adoption, 2) develop a theoretical scaffold for the study by distinguishing adoption, continuance, and discontinuance, 3) outline continuance forces that would influence whether an organization will continue with a cloud ES subscription, and 4) demonstrate factors that lead to commitment for cloud ES.

2.1 Cloud ES Adoption

Despite interest from the academia and practice, no standard definition of cloud ES exists. Therefore, for this study, we define cloud ES via amalgamating the National Institute of Standards and Technology's (NIST) (see Mell & Grance, 2011) conceptualization of cloud computing[2] and Markus et al.'s (2003) definition of ES. Herein, we define cloud ES as commercial software packages that enable organizations to integrate their business processes and transaction-oriented data using a model that enables ubiquitous, convenient, on-demand network access with minimal management effort or service provider reaction. The term "on demand" aligns with the notion of subscription-based access of a cloud-based ES. The subscription-based nature of cloud ES has a clear link with the adoption process.

We systematically reviewed the literature on SaaS by searching the AIS basket of eight journals and the proceedings of major conferences such as ICIS and ECIS for the terms "SaaS" and "software as a service" and found a rich and steadily expanding body of literature investigating the drivers of SaaS adoption. However, much research on cloud ES has focused on the circumstances under which organizations introduce cloud ES. Because SaaS represents a special form of system sourcing, empirical and conceptual research has largely adopted the theoretical perspectives of classical outsourcing, such as the resource-based view (Sedera, Lokuge, Krcmar, Srivastava, & Ravishankar, 2014; Xin & Levina, 2008) or transaction cost theory (Susarla, Barua, & Whinston, 2009). Since SaaS is a relatively new phenomenon, little research has examined it (Eden, Sedera, & Tan, 2012). Accordingly, we could identify only two conceptual papers (Walther & Eymann, 2012; Wang, 2011) and one empirical paper (Benlian, Koufaris, & Hess, 2011) that has dealt with SaaS continuance. In fact, beyond the scant studies on SaaS and the later phases of the software lifecycle, we found little research on ES in general (Esteves & Bohoquez, 2007). The lack of research on cloud-based ES and continuance is surprising given that cloud

[2] This study subscribes to the NIST definition of cloud computing as a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources that can be rapidly provisioned and released with minimal management effort or service provider reaction.

computing service models mostly use a subscription model (Mell & Grance, 2010) and that organizations can theoretically cancel the subscription service at any time without penalty. The discontinuance of cloud computing opposes classical on-premise ES, which usually adopt long-term license-based payment models that lock in decision makers. Indeed, anecdotal commentaries about SaaS providers having problems in retaining their customers (e.g., Salesforce.com) indicate organizations' freedom in being able to leave the subscription model freely.

Information systems researchers have predominantly looked at the adoption of on-premise ES (e.g., Soh, Kien, & Tay-Yap, 2000; Sykes, Venkatesh, & Johnson, 2014; Venkatesh, Morris, Davis, & Davis, 2003). This study belongs to the well-established stream of studies on technology adoption. Some scholars have argued that adoption is not a binary decision (i.e., adoption vs. non-adoption) but a process with many phases (e.g., Choudhury & Karahanna, 2008; Karahanna, Straub, & Chervany, 1999; Pavlou & Fygenson, 2006). While the total number of stages ranges from five (e.g., Shoham, 1992) to seven (e.g., Mintzberg, Raisinghani, & Theoret, 1976), researchers have established consensus around five common stages: awareness → interest → evaluation → trial → continuance. Despite this consensus, many studies in technology adoption have limited their empirical understanding to 1) simple technology adoption (e.g., electronic commerce or electronic channels adoption) and 2) technology adoption in a single broad stage (e.g., pre-adoption, adoption and post-adoption). As Damanpour and Schneider (2006) note, the current approaches of technology adoption studies can neither explain the complex nature of corporate-wide system adoption nor differentiate the changes in the importance level of each factor in different stages of the adoption process. Moreover, we lack studies that have investigated the "continuance" of cloud computing use.

2.2 Adoption, Continuance, and Discontinuance

Given the absence of a strong organizational level *continuance* theory, we structured our a priori model according to the *discontinuance* model as Furneaux and Wade (2011) suggest. Therefore, analogously to change forces (e.g., system performance shortcomings), we identified continuance forces and continuance inertia that research has predicted to positively influence continuation intention. In this process, we took a socio-technical approach: we identified system quality and information quality as related to technology. Further, we identified net benefits as socio-organizational *continuance force* based on the argument that a good way to predict continued use of information systems is to evaluate their level of operational success. In addition, to keep our model coherent, we identified technical integration as related to technology and system investment as socio-organizational *continuance inertia*. We grounded the framework at the organizational level of analysis (Rousseau, 1985) and used an individual ES the object of analysis.

A substantial body of research on technology adoption exists. Presenting technology adoption as a process commenced in the 1960s when Rogers (1962) introduced a model comprising five adoption stages. Since then, many revised models have appeared in the IS literature (e.g., Ettlie, 1980; Fichman & Kemerer, 1997; Salim, Sedera, Sawang, & Alarifi, 2014). As Fichman and Kemerer (2012) discuss, the term "technology adoption" explains a broader spectrum of activities that start from awareness of the technology through to the widespread deployment of the technology in the organization. This view concurs with the broader stages of technology adoption, including pre-adoption, adoption, and post-adoption, that prior studies have discussed (e.g., Aguirre-Urreta & Marakas, 2012; Schwarz, Chin, Hirschheim, & Schwarz, 2014). However, some studies employ a four-phased adoption process of initiation, adoption, decision, and implementation (e.g., Pierce & Delbecq, 1977; Rogers, 1962; Zmud, 1982).

As we state in Section 2.1, the several studies that discuss the stages of adoption (e.g., Ettlie, 1980; Guo & Barnes, 2011; Verville & Halingten, 2003) agree that it involves at least five stages: 1) awareness / need identification / knowledge, 2) interest / information search / product brokering, 3) evaluation / selection / negotiation, 4) trial / choice / decision, 5) commitment / purchase / implementation / adoption. Once adopted, as Eden, Sedera, and Tan (2014) point out, organizations are less likely to replace or retire their on-premise ES. However, given the subscription nature of cloud ES and our focus on continuance, we do not seek to find factors that influence whether an organization will *adopt* a cloud ES.

Literature on adoption, continuance, and discontinuance from an individual perspective has mainly built on theories from cognitive and social psychology, such as expectancy-value theory (Fishbein & Ajzen, 1975) or the theory of planned behavior (TPB) (Ajzen, 1991). Accordingly, research on the adoption of the artifacts with regard to individuals has mainly evolved around the technology acceptance model (TAM) (Davis, 1989), whereas researchers have mainly studied the individual-level continuance of the artifacts using expectation-confirmation theory (ECT) (Oliver, 1980), which has taken shape in the expectation-confirmation model (ECM) (Bhattacherjee, 2001) and its popular extensions (e.g., Bhattacherjee, Perols, & Sanford, 2008) in IS research. In contrast to the rich body of both adoption and continuation research of individuals, research on organizational level continuance and discontinuance remains sparse (Furneaux & Wade, 2011; Jeyaraj, Rottman, & Lacity, 2006). This complementary stream of research has investigated organizational level adoption, continuance, and discontinuance building on paradigms such as the technology-organization-environment framework (TOE) (Tornatzky & Fleischer, 1990), diffusion innovation theory (DOI) (Rogers, 1962), and social contagion (Teo, Wei, & Benbasat, 2003). According to Jeyaraj et al. (2006), the quantity and speed of innovation adoption and diffusion in organizations depends on innovation characteristics (factors that describe the innovation, such as communicability or ease of use), organizational characteristics (such as administrative intensity or costs), and, finally, environmental characteristics (such as industry type, maturity or market competition). Their view suggests that research on organizational-level adoption has mainly investigated the question under which structural *predispositions* cause organizations to adopt a specific artifact. In contrast, we focus on factors that lead to the continuance of operational information systems, which implies that one can evaluate the performance and success of a system in contrast to the pre-adoption phase in which one can only make predictions. This investigation has far-reaching implications for model development because it allows one to integrate post-adoption variables as predictors of continued information systems use.

2.3 Continuance Forces: Information Systems Success

Conceptually, one can base the antecedents of continuance decision on TPB (Ajzen, 2011). Researchers argue that one can predict an individual's intention (in this case, the decision maker's intention) to continue new technology based on: 1) the individual's attitudes towards the behavior, 2) subjective norms, and 3) perceived behavioral control (Ajzen, 1985, 1991; Phang et al., 2006; Sawang, Sun, & Salim, 2014). TPB also suggests that several factors can explain behavior: behavioral belief, normative belief, and control belief as the antecedents of attitudes, subjective norms, and perceived behavioral control, respectively (Ajzen, 1991; Bulgurcu, Cavusoglu, & Benbasat, 2010). Though most studies in this domain have focused on dimensions such as psychological states, few studies have focused on specific continuance aspects. In this study, we argue that organizations decide whether to continue subscribing to an already "adopted" IS based on how well the system is performing at multiple levels. The decision to employ a model that observes system performance is reasonable given that there are no substantial differences between resource commitments and skill requirements in cloud ES adoption.

Gable, Sedera, and Chan (2008) state that the positive impacts will ultimately become the "acid test" of the IS in which one needs to ask: "Has the IS benefited the organization?" or "Has the IS had a positive impact?" (e.g., Lokuge & Sedera, 2014a, 2014b; Melville, Kraemer, & Gurbaxani, 2004). In general, the IS, being a long-term investment, should (ceteris paribus) yield a continuing flow of benefits into the future. Thus, other questions of interest include: "Is the IS worth keeping?", "Does the IS need changing?", and "What future impacts will the IS deliver?". Thus, the evaluation to keep an IS (continuance) will depend on the success of the IS.

The IS success model (DeLone & McLean, 1992) and its revision (DeLone & McLean, 2003) have evolved as predominant frameworks to structure IS success (Urbach, Smolnik, & Riempp, 2009). Similarly, we selected the DeLone and McLean model for four reasons. First, researchers have applied the IS success model in several contexts, such as e-commerce success (Wang, 2008), enterprise systems success (Gable, Sedera, & Chan, 2008), or to evaluate the success of employee portals (Urbach, Smolnik, & Riempp, 2010). Second, because the model has quite comprehensive categories, the results are easy to communicate. Third, it is the most widely used success measurement framework and, therefore, provides a high degree of external validity. Fourth, the IS success model has proven to be able to represent ES-specific (Gable et al., 2008; Sedera, 2006) and SaaS-specific (Walther, Plank, Eymann, Singh, & Phadke, 2012) success dimensions in an exhaustive manner (Tate, Sedera, McLean, & Burton-Jones, 2013). In this study, we more specifically subscribe to the stream that treats the IS success model as a measurement model rather than a causal model (e.g., Gable et al., 2008). Thus, the selected dimensions of success reflect a measurement model rather than a model of causality.

DeLone and McLean (2003) advise researchers to select the suggested dimensions of success appropriate to the context and the research problem. We eliminate three such dimensions through logical reasoning: 1) user satisfaction, 2) use, and 3) service quality.

First, in empirically validating the DeLone and McLean model, Gable et al. (2008, p. 388) argue that one does not need use satisfaction in assessing system performance. They argue that:

> *Early satisfaction constructs in IS success evaluation (e.g., user information satisfaction—Bailey & Pearson, 1983) have been found to mix measures of multiple success constructs (e.g., quality and impact) rather than measure a distinct satisfaction construct (Gable, 1996). Rai et al. (2002) state that user satisfaction has been measured indirectly through information quality, system quality and other variables in prior studies. Additionally, Sedera and Tan (2005) demonstrated—through content analysis of 192 satisfaction-related items from 16 Satisfaction instruments—that 98 percent (189) of the measures readily map into existing measures pertaining to system quality, information quality, individual impact and organizational impact; with only two percent of the items (3 items) appearing to measure satisfaction explicitly.*

In light of past concerns and given their results, Gable et al. (2008) argue that satisfaction is not a separate dimension of IS success; rather, they believe that satisfaction is an immediate consequence of IS success[3] (Anderson & Sullivan, 1993; Brady, Knight, Cronin, Hult, & Keillor, 2005; Grönroos, 1982, 2000; Spreng & Mackoy, 1996). This view concurs with the findings of Teo and Wong (1998) who studied the impact of system investment on organizational performance. In a similar fashion, they found system use as a construct of IS success to be inappropriate.

Second, in relation to use, Gable et al. (2008, p. 388) argue that "for a range of reasons, several authors have suggested that the use construct is inappropriate to measure IS success (Barki & Huff, 1985; Gelderman, 1998; Seddon, 1997; Yuthas & Young, 1998)". Researchers argue that the construct use has an intermediate role between the constructs quality and impact rather than as a measure of success (Burton-Jones & Gallivan, 2007). For example, Figure 7 (and related discussion) in Gable et al. (2008) highlights that use is the immediate antecedent of impacts and that the quality of information and the system influences it.

Third, we do not employ service quality for two reasons. First, in the broader sense (as opposed to the narrower emphasis of DeLone and McLean (2003) on the IS function), service quality is in many ways analogous with the complete notion of IS success. For example, Grönroos (2000) suggests two main service quality dimensions: functional quality and technical quality. The author states that: "functional quality represents how the service is delivered; that is, it defines customers' perceptions of the interactions that take place during service delivery" and that "technical quality reflects the outcome of the service act, or what the customer receives in the service encounter". With "operational" information systems (the focus of IS success)—that is, systems conceived as a stream of services or a systematized (automated) service—the system (and its quality) are the "functional" and its impacts are the "technical" (or outputs). Second, service quality would entail assessing the services that the service provider provides, which, in a study of SaaS, would be considered as an antecedent rather than a measure of cloud continuance.

2.4 Continuance Inertia: Commitment

Complementary to our efforts to find socio-organizational and technology-related variables of success, we identified additional factors influencing organizational persistence, especially for the context of cloud-based ES. As such, we included system investment as socio-organizational commitment and technical sophistication (see Furneaux & Wade, 2011). Both constructs convey the commitment that an organization would have for a subscription-based technology such as cloud computing. Prior studies have often labeled the importance of system investment, as a source of behavioral persistence, as a "sunk cost phenomenon" (Arkes & Blumer, 1985)—a phenomenon in which managers tend to make consecutive investments despite the fact that rational reasons for discontinuance exist. The sunk cost conception is appropriate when one considers the cost of acquisition as a capital expenditure (commonly referred to as CapX) as much research has done. However, more recent work on system investment has studied its role in the formation of computer software prices when switching between software solutions (Ahtiala, 2006) and its impact in consecutive IS outsourcing decisions (Benlian, Vetter, & Hess, 2012). System investment is an interesting variable in the light of cloud computing because research and practice often states that cloud computing has "low entry barriers" and a "low upfront cost" as benefits (Armbrust et al., 2010). These benefits suggest that one can easily turn cloud services on and off in a way similar to a telephone

[3] The conception of satisfaction as immediate consequence of IS success, too, has support in the marketing field. Service marketing researchers (e.g., Brady et al., 2005; Anderson & Sullivan, 1993; Spreng & MacKoy, 1996) employ a nomological net that positions satisfaction as an immediate consequence of marketing service quality.

system as McCarthy outlined in 1961 (Wei & Blake, 2010). The system investment in cloud in contrast to the fact that ES usually feature large implementation costs would imply that system investment plays a significant role in the continuance of cloud-based ES.

As for technical integration, we observe whether the characteristics of the “technology” influence the continuance decision. Given that we focus on cloud ES in particular, we expect SMEs to enjoy the sophistication that the technology offers. However, the technology will not necessarily have a positive impact. For instance, SMEs may struggle with its complexity due to their limited technology skills and available knowledge to manage such technologies (Sedera, Gable, & Chan, 2003a, 2003b; Sedera, Gable, & Chan, 2004). In this context, Swanson and Dans (2000) have shown that companies do not wish to discontinue corporate-wide systems if they rely on the functions of their ES, even if the financial benefits are lacking. Eden et al. (2015) make similar observations in relation to the traditional on-premise ES.

Though cloud-based ES solutions purport to provide the much-needed technology landscape and functionality for organizations, not all solutions have the same depth and breadth of technology sophistication. As such, a *lack* of integration capabilities and technology functionalities would encourage organizations to *dis*continue their cloud-based ES.

Overall, we argue that the decision to continue a subscription-based cloud ES depends on the continuance forces and continuance inertia. However, price does not drive this argument; that is, a client organization will not simply select the cheapest cloud ES. For most organizations, the range of subscription price required to assess a cloud ES remain similar. As such, for an organization to continue its cloud ES, it must realize the strategic alignment between the system capabilities and the organizational requirements (Son et al., 2014). Furthermore, the users of the cloud ES must feel that it is not cumbersome to use and learn and that it fits their task requirements (Sedera & Dey, 2013). The hypotheses we develop below capture these views through continuance forces and continuance inertia.

3 Hypotheses Development

In this section, we develop our hypotheses and Figure 1 presents the resulting research model.

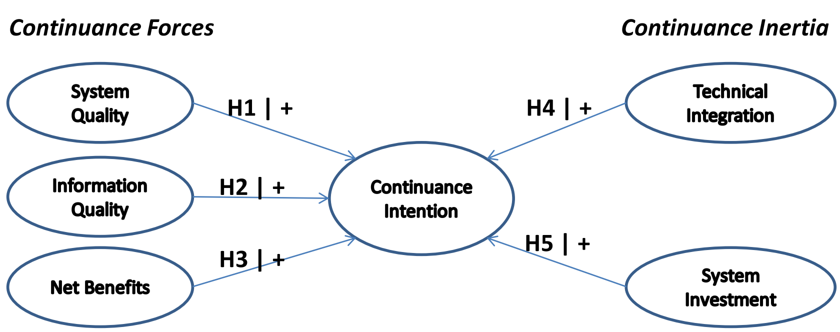

Figure 1. Research Model

3.1 Continuance Forces

We define continuance forces as factors that actively perpetuate the status quo. We assume that a system’s operational success constitutes the strongest argument for why an organization would continue to use a system. Hence, to keep our model coherent with our socio-technical approach, we investigate two technical success measures (information quality and system quality) and one socio-organizational success (net benefits).

3.1.1 System Quality

System quality reflects certain system properties, such as processing power, reliability, or ease of use. System quality has a strong impact on the workflows of operational system users because the input and output of data is interwoven into daily business (i.e., system failure, such as the infamous “blue screen”, might interrupt work in progress or even lead to lost data). In addition, a difficult-to-use system might use up a significant amount of human resources that the organization could better distribute and use elsewhere. Hence, poor system quality can cause an organization to consume valuable resources. Because poor system quality causes IS failure and its associated problems, an organization will try to ensure that it uses a high-quality system. If a system cannot provide these requirements, an organization will likely replace it (Furneaux & Wade, 2011). On the other hand, a cloud-based ES by the same vendor will provide the exact same functionality to all organizations in a cloud "tenant". Though the system's differences in functionality can vary due to access rights that individual organizations may purchase, we capture such variance in other dimensions as we discuss below. Therefore, the mixed empirical support observed between dependent variables and system quality (Petter, DeLone, & McLean, 2008) would be even more applicable to the current study context. Thus, we hypothesize:

H1: System quality is positively correlated with continuance intentions.

3.1.2 Information Quality

Information quality refers to aspects such as format, timeliness, or comprehensibility. Among their main tasks, ES provide information for strategic, management, and operational needs in a company (Anthony, 1965). Poor information quality can harm the company on several organizational levels. For instance, operational users of the system require data in a certain format because transferring data between input interfaces that use different formats can consume considerable time. In addition, managers often base strategic decisions on an aggregation and analysis of fundamental data and, accordingly, the information quality significantly affects their organizational behavior. If a system cannot provide relevant and properly formatted data for managers, they might start questioning the potential of the IS. A cloud-based ES does not provide an organization with greater configurational or customizable flexibility to meet its specific needs. Instead, cloud-based ES provide a "straitjacket" approach that minimizes the level of customization and modifications. Such approaches facilitate better information quality (Seddon, Calvert, & Yang, 2010; Volkoff, Elmes, & Strong, 2004). Furthermore, no sufficient empirical evidence shows a relationship between information quality and continuance intention so far (Petter et al., 2008). Thus, we hypothesize:

H2: Information quality is positively correlated with continuance intentions.

3.1.3 Net Benefits

Net benefits refer to the extent to which an information system benefits individuals, groups, and organizations (DeLone & McLean, 2003). Information systems primarily support companies in their business processes. Hence, they represent a means to an end, such as profitability and productivity (Brynjolfsson, 1993; Hitt & Brynjolfsson, 1996). However, an IS does not necessarily always bring business benefits to an organization. Many studies have shown how IS does not add favorable results to organizations. As such, we need to see whether an ES as an IS in an organization supports an organization's business processes, increases its productivity, and/or reduces its exposure to risks as essential parts of whether the organization continues to use the ES. Furthermore, studies that use the DeLone and McLean model have presented some empirical evidence for a relationship between net benefits and continuance intention (Petter et al., 2008). However, considering the cloud-ES context, research has yet to determine its benefits. Thus, we hypothesize:

H3: Net benefits are positively correlated with continuance intentions.

3.2 Continuance Inertia

We define continuance inertia as sources that positively influence an organization to continue using an information system. In our study, we use technical integration and system investment to represent continuance inertia as Furneaux and Wade (2011) do. Furneaux and Wade (2011) employ institutional pressures as their third variable. They define institutional pressures through 1) coercive, 2) normative, and 3) mimetic pressures that can lead organizations to conform to the practices of other organizations (DiMaggio & Powell, 1983). However, we exclude institutional pressures from our study because we 1) focus on cloud ES continuance, 2) contemporary IS such as cloud ES do not typically involve compliance with regulatory bodies, and 3) factors such as mimetic pressures relate to the adoption of a new system rather than to its continuance.

3.2.1 Technical Integration

Technical integration refers to the extent to which an information system relies on sophisticated linkages among its component elements to deliver the required capabilities (Furneaux & Wade, 2011). Despite the vision of seamless service-orientation in contemporary ERP systems, information systems usually reside in an interwoven information technology network. However, these interrelations between operational systems often lack sufficient documentation, which leads to unpredictable system performance when one replaces a system. In addition, organizations form replacement intentions more easily with systems with low complexity as opposed to those with high complexity and integration due to the likely difficulties in discontinuing them (Furneaux & Wade, 2011), which can result in performance shortcomings that severely damage daily operations. Thus, we hypothesize:

H4: Technical integration is positively correlated with continuance intentions.

3.2.2 System Investment

System investment refers to "the financial and other resources committed to the acquisition, implementation, and use of an information system" (Furneaux & Wade, 2011). A variety of investments usually accompany efforts to implement and maintain an information system, such as capital and human resource investments. Many argue that such investments in traditional ES are much higher at the time of the implementation and that they then plateau over time (Ng & Gable, 2010). However, most organizations will not need to expend any substantial expense in adopting cloud ES. In addition, decision makers have expressed their feeling of "wasting" resources (Furneaux & Wade, 2011) when discontinuing a system. Therefore, the financial commitment can influence an organization's decision about whether to continue to use an information system or not. Thus, we hypothesize:

H5: System investment is positively correlated with continuance intentions.

4 Design and Methodology

Given our objectives and hypotheses, we adopted a quantitative survey approach. In this section, we discuss our research design, how we developed our instrument, and how we collected and analyzed the data.

4.1 Research Design

In employing the theoretical underpinnings of continuance, we followed established guidelines for developing an instrument (i.e., creating the items, developing the scales, and testing the instrument) that Moore and Benbasat (1991) espouse MacKenzie, Podsakoff, and Podsakoff (2011) discuss in detail. We used theory and the literature to help create the items and develop the scales. Figure 2 illustrates the specific process that we followed.

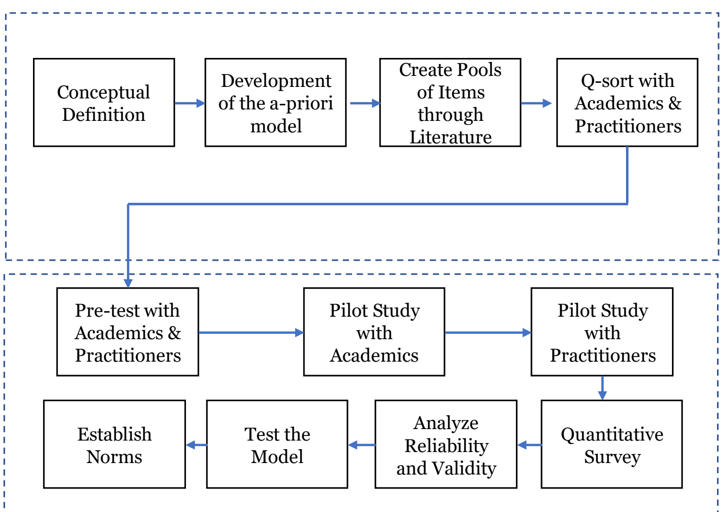

Figure 2. Research Design

As per Figure 2, we draw the conceptual definition from the theoretical foundations of discontinuance. In doing so, we could determine the constructs to be specified in the a priori model. Once we specified the model, we derived a pool of survey items through the literature. Next, we established content validity by observing the degree to which each dimension reflects (the operationalizing measure) its nominated construct. We established measurement representativeness, comprehensiveness, and clarity using the Q-sort approach following Grant and Davis's (1997) suggestions[4]. Next, we conducted several pre- and pilot tests to ensure the items had adequate wording, the sequence of questions, and that the respondents understood the instructions.

4.2 Instrument Development

To test the research model, we used both formative and reflective measures (see Table 1) (Gable & Sedera, 2009; Sedera, Gable, & Chan, 2003c). We measured the items on a seven-point Likert scale that ranged from "strongly disagree" to "strongly agree". We measured continuance forces formatively because formative measurement provides a concept's specific and actionable attributes (Mathieson, Peacock, & Chin, 2001), which is particularly interesting from a practical viewpoint. In formative measurement, one can use the weight of single indicators to draw practical implications on the importance of specific details and, thus, provide guidance about enforcing these system characteristics in practice (e.g., "overall system quality is high" (reflective) vs. "system is easy to use" (formative)). To model "actionable attributes", we could have used multi-dimensional constructs and, thus, have measured first-order constructs (dimensions) reflectively (e.g., Wixom & Todd, 2005). However, considering decision makers' time constraints, this approach would have been rather impracticable because it would have raised the number of questions by three (assuming three indicators per first-order construct). Measuring these constructs formatively would add little to the study's practical contributions. Therefore, we measured these constructs using well-validated reflective scales (Furneaux & Wade, 2011). We developed the formative instrument while considering Moore and Benbasat's (1991) recommendations and more recent scale-development procedures (Diamantopoulos & Winklhofer, 2001; MacKenzie, Podsakoff, & Podsakoff, 2011; Petter, Straub, & Rai, 2007). In developing formative measures, we focused on promoting mutual exclusivity and parsimony; that is, we focused on identifying the most-suitable single measure to include in the a priori model. For example, in a formative model, the accuracy and parsimony of measures is vital because all measures and dimensions should be necessary. As such, the model should have minimal redundancy or overlap (mutual exclusivity) and no unnecessary dimensions or measures.

In the conceptualization and content specification phase, we clearly defined the constructs and identified SaaS-specific success measures by conducting a content-based systematic literature review while considering Webster and Watson's (2002) recommendations. To these newly identified SaaS-specific measures, we added existing ES success measures (Gable et al., 2008) and general IS success measures (Wixom & Todd, 2005). As a result, we produced an initial set of 39 net benefit measures, eight information quality measures, and 21 system quality measures. We reduced these measures by culling or dropping items that seemed too narrow or insignificant in our context of investigation. Based on identifying the relevant dimensions, we then generated an item pool that represented all aspects of the construct while minimizing the extent to which the items tapped concepts outside of the domain of the focal construct (MacKenzie et al., 2011). Because dropping a measure from a formative-indicator model may omit a unique part of the conceptual domain and change the meaning of the variable as a construct is a composite of all the indicators (MacKenzie, Podsakoff, & Jarvis, 2005) and because keeping irrelevant items will not bias the results when analyzing the data using PLS (Mathieson et al., 2001), we kept and transformed all initially identified dimensions into items. We assessed content validity, which refers to the degree to which items in an instrument reflect the content universe to which one will generalize the instrument (Straub, Boudreau, & Gefen, 2004), using the Q-sorting procedure, which, according to Petter et al. (2007), is one of the best methods to ensure content validity for formative indicators. In this effort, we followed a two-round procedure. In the first round, we provided a list of the previously created items and construct definitions to a group of four researchers. The participants then had to match the items to the different constructs. The first round showed a low average hit ratio of 0.67 and a Cohen's kappa (Cohen, 1968) of 0.63. After identifying and changing problematic items (e.g., wording, intersection between items), we repeated this procedure. In the second round, the hit ratio rose to 0.85 and Cohen's kappa was clearly above the recommended threshold level of 0.65 (e.g., Todd & Benbasat, 1992). After this round, we modified two more items. We performed the pre-test to initially test the complete instrument—

[4] The approach we followed here is analogous to the Q-sort approach that Kendall et al. (1987) suggest for attaining content validity.

especially its wording, length, and instructions (Moore & Benbasat, 1991). We distributed the survey to sales and consulting divisions of one of the largest cloud service providers worldwide and to a group of researchers. We distributed the survey online. The survey provided a textbox underneath each question page that allowed participants to freely comment on any issues that arose. We obtained 19 questionnaires in this phase. As a result, we made a few changes to the instrument, such as shortening the introductory text and rewording "my cloud enterprise system" to "our cloud enterprise system" to highlight the study's organizational nature.

We describe how we quantitatively evaluated the formative measurement model in Section 5. We employed techniques such as expert validation and subjecting the items to respondents for a pre-test (Anderson & Gerbing, 1991; Schriesheim, Cogliser, Scandura, Lankau, & Powers, 1999) in the procedural stage of evaluating and refining the scales to increasing its discriminant validity.

Table 1. Constructs and Definitions

Construct	Definition	Literature sources
System quality (formative)	The desirable characteristics of a system (e.g., ease of use, reliability, response time, etc.).	Bailey & Pearson (1983), DeLone & McLean (1992, 2003)
Information quality (Formative)	The desirable characteristics of system output (e.g., completeness, format, relevance, etc.).	Bailey & Pearson (1983), DeLone & McLean (1992, 2003)
Net benefits (formative)	The extent to which an information system is beneficial to individuals, groups, and organizations.	DeLone & McLean (1992, 2003)
System investment (reflective)	The financial and other resources committed to the acquisition, implementation, and use of an information system.	Furneaux & Wade (2011), Gill (1995), Keil, Mann, & Rai (2000)
Technical integration (reflective)	The extent to which an information system relies on sophisticated linkages among component elements to deliver needed capabilities.	Furneaux & Wade (2011), Swanson & Dans (2000)
Continuance intention (reflective)	The extent to which organizational decision makers tend to continue using an information system.	Bhattacherjee (2001), Furneaux & Wade (2011)

Note that we acknowledge the debate in the literature (Sharma, Yetton, & Crawford, 2009) about the common practice of gathering perceptual data on both the independent variable and the dependent variable from the same respondent. The debate focuses on the concern that such a practice may lead to an unacceptable degree of common method variance (CMV)[5]. However, as Gorla, Somers, and Wong (2010) observe, CMV is more likely to exist in abstract constructs (e.g., attitude) than in the concrete measures associated with IS success. Malhotra et al. (2006) also assert that the constructs of IS success are less susceptible to CMV. Moreover, CMV is less of a concern with formative constructs given that the items need not co-vary. Furthermore, when operationalizing the survey instrument, in order to further reduce the common method variance, we did not group the items for the reflective constructs under their construct headings (Gorla et al., 2010; Sharma et al., 2009).

4.3 Data Collection

To select the sample, we had to consider several control variables. First, we decided to select organizations that used the same software vendor to derive a sample comparable in relation to the technology functionalities but homogeneous in the type of the ES. We avoided gathering data from software vendors who offered single process solutions such as accounting or human capital management and focused on organizations that used a full suite of ES modules.

Furthermore, the geographical region was a control variable to minimize issues that pertain to low levels of influence on IT infrastructure. Through discussions with software companies who offer cloud-based ES solutions, we decided to conduct the study with the SAP's cloud ES client base. Controlling the extraneous factors made it easier to make the core study findings clear. We selected respondents based

[5] The rationale here is that, when gathering data (on both the individual variable and dependent variable) from the same respondent, spurious correlations could result (due to the common method used in data collection), which one cannot necessarily attribute to the underlying phenomena that one tests.

on the key decision maker for the cloud-based ES in the organization. With that said, we acknowledge that teams and not a single individual will most likely decide whether to discontinue using a system or not.

From conducting a pilot test at a local business, we found that a decision to discontinue (e.g., as opposed to the dissatisfaction) would be a decision that a team reached unanimously. As such, we justify using an individual to represent the entire organization (even within a team of participants) based on the logic that the individual's opinions would represent the team's.

We conducted the survey over a five–month period. We made it available as an online survey, on paper, and as an interactive PDF file. We distributed it over several distribution channels, such as the social media channels of cloud service providers, or made it directly available to decision makers who had adequate backgrounds (which we determined, for example, via business networks such as LinkedIn and XING). After dropping 23 invalid questionnaires, we used 115 questionnaires to test the research model (see respondent details in Table 2).

Table 2. Study Sample Characteristics

Position in company	# and % of respondents		Employees	# and % of respondents		Time since implementation	# and % of respondents	
Top management	52	45%	1 to 99	35	30%	1-6 months	26	23%
IT executive	34	30%	100 to 249	14	12%	7-12 months	29	25%
Business manager	17	15%	250 to 499	29	25%	13-18 months	36	31%
IT personnel	10	9%	500 to 999	16	14%	18+ months	24	21%
Others (e.g., IT strategy)	2	2%	1000+	21	18%			

Due to the methodology of the survey, individuals reported on organizational or group properties. As such, we had to make sure that the participants possessed adequate knowledge. Hence, we applied the key informant approach (Segars & Grover, 1998), which included a note in the introduction part of the questionnaire that indicated that the study addressed key decision makers and a specific question at the beginning of the questionnaire that asked if the participants were involved in system continuance decisions in their organization. In addition, to increase content validity, we asked the participants to fill out the questionnaire regarding only one specific type of ES. Due to the distribution method via social media platforms, we could not reliably calculate the response rate. However, to address the possibility of response rate bias, we used a stratified sample of decision makers.

4.4 Data-analysis Mechanisms

We analyzed the data using SmartPLS version 2.0.M3 and SPSS. We used SPSS to calculate variance inflation factors and to run additional exploratory factors analyses. We chose a variance-based approach to analyze the structural model for four reasons. First, the partial least squares (PLS) approach suits small to medium sample sizes because it provides parameter estimates at low sample sizes (Chin, Marcolin, & Newsted, 2003; Hulland, 1999). Second, PLS is more appropriate for exploratory research (Gefen, Rigdon, & Straub, 2011), especially to explore new structural paths in incremental studies that build on prior models (Chin, 2010). Third, due to its variance-based approach, PLS suits predictive analytics well. Because we focused on finding drivers of organizational-level continuance and not on testing a specific behavioral model, PLS suited our context (Urbach & Ahlemann, 2010).

5 Results

We report the PLS estimates according to recommendations that Hair, Ringle, and Sarstedt (2011) provide and in a two-step approach as Chin (2010) outlines. We analyzed both the measurement model and the path model with parameter settings using 115 cases and 5,000 samples (Hair et al., 2011). We replaced missing values using the mean replacement algorithm that SmartPLS supports[6].

[6] In the 115-data sample, only 18 missing values were replaced using this mechanism.

5.1 Measurement Model

We assessed the reflective measurement model by estimating internal consistency and discriminant and convergent validity (see Table 3). The instrument showed satisfactory reliability because the reflective factor loadings were all above 0.64—clearly above the proposed threshold level of 0.5 (Hulland, 1999). Composite reliability also was adequate in that all constructs were above 0.85 (Nunnally & Bernstein, 1994). Furthermore, we employed the Herman's one-factor test to observe any common method variance. The test results revealed that not all measures loading into a single factor solution, which confirms that CMV was unlikely.

Table 3. Quantitative Assessment of Measurement Model (Reflective)

Continuance intention * (reflective) (adapted from Bhattacharjee, 2001)		Loadings	t-value	AVE	Composite reliability
CI1	We intend to continue the subscription of our cloud enterprise system rather than discontinue its subscription.	0.866	12.300	0.74	0.85
CI2	We intend to continue the subscription of our cloud enterprise system than to subscribe to any alternative means.	0.853	18.727		
Technical characteristics (reflective) (adapted from Furneaux & Wade, 2011)					
TC1	The technical characteristics of the system make it complex.	0.931	19.343	0.89	0.96
TC2	The system depends on a sophisticated integration of technology components.	0.964	22.714		
TC3	There is considerable technical complexity underlying this system.	0.938	18.156		
System investment (reflective) (adapted from Furneaux & Wade, 2011)					
SI1	Significant organizational resources have been invested in this system.	0.641	2.253	0.73	0.89
SI2	We have committed considerable time and money to the implementation and operation of the system.	0.947	3.148		
SI3	The financial investments that have been made in this system are substantial.	0.946	3.120		
* We dropped one item due to poor psychometric properties.					

We established convergent validity because the average variance extracted (AVE) of all constructs was clearly above 0.5 (Fornell & Larcker, 1981). All square roots of each AVE were higher than the corresponding latent variable correlations and, thus, showed a desirable level of discriminant validity (see Table 4).

Table 4. Discriminant Validity

Latent construct	1	2	3	4	5	6
1. System quality	**Formative**					
2. Information quality	0.68	**Formative**				
3. Net benefits	0.63	0.54	**Formative**			
4. Technical integration	-0.15	-0.05	-0.16	**0.89**		
5. System investment	-0.28	-0.07	-0.25	0.68	**0.73**	
6. Continuance intention	0.68	0.52	0.56	-0.16	-0.16	**0.74**

We observed strong and significant correlations between system quality and information quality, which we expected given that system and information qualities can influence one another. Indeed, Gable et al. (2008) made similar observations. Second, the results show that system quality had the highest correlation with net benefits. Though the research model does not explicitly show this correlation, this finding is also important. Similarly, the finding concurs with Gable et al.'s (2008) study. On the other hand, the high correlation between system investment and technical integration suggests that a reasonable investment increases system features and functions—a tautological relationship but insightful. Lastly, continuance intention had a strong and significant relationship with system quality, information quality, and net benefits, which concurs with the DeLone and McLean IS success model and past studies (e.g., Gable et al., 2008).

We assessed the formative measures using the three-step procedure that Hair, Hult, Ringle, and Sarstedt (2013) propose (see Table 5). First, we assessed convergent validity, which refers to the extent to which a measure correlates positively with other measures of the same construct (Hair et al., 2013). In other words, formative constructs should highly correlate with reflective measures of the same construct. This test is also known as redundancy analysis (Chin, 1998). All constructs showed adequate convergent validity with path strengths that ranged from 0.82 to 0.87—above the recommended threshold level of 0.8 (Chin, 1998). The reflective set showed adequate convergent validity with values above 0.96. Second, we assessed the measurement model for collinearity issues by calculating the variance inflation factors (VIF) of each indicator by following the guidelines of Diamantopoulos and Siguaw (2006) and Diamantopoulos and Winklhofer (2001). The VIF test observes possible issues with multi-collinearity among the measures. Formative measurement models are essentially based in regression (of the formative construct against its measures), which means that the strength of measures' inter-correlations (and sample size) can be affected by the stability of their coefficients. Thus, excessive collinearity among measures makes it difficult to separate the distinct influence (and, hence, the validity) of the individual measures on the formative construct (Bollen, 1989). In addition, if a measure is a linear (or near-linear) combination of other measures, it would suggest that the indicator is redundant (in the context of the formative construct) and that one should, therefore exclude it from the construct in the interests of parsimony[7]. Thus, we determined the VIF for the formative measures to determine which measures we should exclude. All VIFs were clearly below the recommended threshold level of 5 (Hair et al., 2013). As such, we found no significant multi-collinearity among the measures. Despite the observations of reasonable VIF scores, we allude to the possibility of high correlations between system quality, information quality, and net benefits as influencing our findings.

Third, we assessed indicators in the research model for significance and relevance. Several formative indicators were not significant at the $p = 0.1$ level. However, this finding is not surprising since, according to Cenfetelli and Bassellier (2009), the higher the number of indicators, the more likely they are to be non-significant because several indicators "compete" to explain the variance in the target construct. In their seminal paper, Mathieson et al. (2001) employ seven formative indicators to measure perceived resources, of which four were insignificant. In our study, system quality had three significant indicators at the $p = 0.1$ level, whereas information quality had only one significant indicator. Net benefits had two significant indicators. Cenfetelli and Bassellier (2009) note that one should not interpret the non-significance of indicators as irrelevance. It means only that these indicators have a smaller influence on the target construct than other indicators do (weight). Further, one should not interpret negative indicator weights (Cenfetelli & Bassellier, 2009) as the item having negative impact on the construct but that it is more highly correlated with indicators of the same measure than with the construct it measures.

To handle insignificant and negative indicators, we followed a procedure that Hair et al. (2013) recommend to eliminate problematic items by assessing both significance and loadings of the items. While the weight of an item indicates its relative importance, loadings represent the absolute contribution of the indicator. In other words, an indicator can be relatively unimportant; however, when "stronger" indicators are deleted or not available, these indicators can still give a good estimation if the loadings are high. All outer loadings were above 0.5 except for the items NB8 (innovation ability) and NB11 (staff requirements). Both indicators' loadings were significant; hence, we kept them.

[7] We acknowledge that some researchers (Petter et al., 2007) suggest retaining non-significant indicators in attention to completeness and content validity.

Table 5. Quantitative Assessment of Measurement Model (Formative)

Redundancy analysis, assessing multi-collinearity, significance, and contribution					
Net benefits		**VIF**	**t-value**	**Weights**	**loadings**
Our cloud enterprise system					
NB1	…increases the productivity of end users	3.696	0.160	0.034	0.751
NB2*	…increases the overall productivity of the company	3.557	2.078	0.485	0.806
NB3*	…enables individual users to make better decisions	1.875	1.786	0.342	0.660
NB4	…helps to save IT related costs	2.912	1.072	0.287	0.515
NB5	…makes it easier to plan the IT costs of the company	2.475	1.474	-0.308	0.313
NB6	…enhances our strategic flexibility	3.923	0.595	-0.153	0.492
NB7	…enhances the ability of the company to innovate	3.559	1.278	-0.331	0.313
NB8	…enhances the mobility of the company's employees	2.855	0.342	0.082	0.657
NB9	…improves the quality of the company's business processes	2.156	0.918	0.235	0.593
NB10	…shifts the risks of IT failures from my company to the provider	1.888	1.495	0.328	0.562
NB11	…lower the IT staff requirements within the company to keep the system running	1.708	0.539	0.141	0.365
NB12	…improves outcomes/outputs of my company	1.955	0.504	0-122	0.514
Net benefits (reflective) (adapted from Wixom & Watson, 2001)		**f**			
Redundancy analysis		0.815			
NB13	…has changed my company significantly		23.901		0.903
NB14	…has brought significant benefits to the company		91.381		0.938
System quality (formative)		**VIF**	**t-value**	**Weights**	**loadings**
Our cloud enterprise system					
SQ1#	…operates reliably and stable	1.570	0.729	0.088	0.530
SQ2#	…can be flexibly adjusted to new demands or conditions	2.463	1.399	0.257	0.785
SQ3#	…effectively integrates data from different areas of the company	2.152	0.941	-0.148	0.619
SQ4#	…makes information easy to access (system accessibility)	2.201	0.093	0.015	0.574
SQ5	…is easy to use	2.245	0.450	0.071	0.586
SQ6#	…provides information in a timely fashion (response time)	1.941	0.234	-0.035	0.515
SQ7*	…provides key features and functionalities that meet the business requirements	2.257	2.117	0.338	0.803
SQ8*	…is secure	1.334	2.090	0.250	0.638
SQ9	…is easy to learn	2.308	0.342	-0.055	0.504
SQ10	…meets different user requirements within the company	2.031	0.543	0.105	0.654
SQ11	…is easy to upgrade from an older to a new version	1.643	1.053	0.152	0.638
SQ12*	…is easy to customize (after implementation, e.g., user interface)	2.006	1.857	0.318	0.762
System quality (reflective) (Adapted from Wixom & Todd, 2005)		**f**			
Redundancy analysis		0.808			
SQ13#	In terms of system quality, I would rate our cloud enterprise system highly		141.426		0.969
SQ14#	Overall, our cloud enterprise system is of high quality		136.564		0.969
Information quality (formative)		**VIF**	**t-value**	**Weights**	**loadings**
Our cloud enterprise system					

Table 5. Quantitative Assessment of Measurement Model (Formative)

IQ1#	…provides a complete set of information	2.313	0.070	0.016	0.726
IQ2#	…produces correct information	2.280	0.194	-0.054	0.661
IQ3#	…provides information which is formatted	2.711	0.010	-0.025	0.725
IQ4#*	…provides me with most recent information	2.793	1.632	0.460	0.879
IQ5	…produces relevant information with limited unnecessary elements	2.774	1.412	0.393	0.905
IQ6	…produces information which is easy to understand	2.903	1.491	0.317	0.841
Information quality (reflective) (adapted from Wixom & Todd, 2005)		**f**			
Redundancy analysis		0.868			
IQ7#	Overall, I would give the information from our cloud enterprise system high marks		85.378		0.961
IQ8#	In general, our cloud enterprise system provides me with high quality information		69.523		0.956
# Wixom and Todd (2005); * significant *at least* at the p = 0.1 level					

5.2 Structural Model

Having established the appropriateness of the measures, we tested the model with the previously outlined parameter settings. Here, we acknowledge that the utility of a cross-sectional study to test causality has its limitations and that researchers recommend a longitudinal study design in studies such as ours. However, the theoretical views of the DeLone and McLean IS success model and the cumulative tradition of research that establish the "causal" paths provide some degree of confidence in our findings based on a snap-shot survey approach.

Our model explained 55.9 percent of the variance in continuance intention (see Figure 3). All hypothesized paths, except for H2, showed significant relationships above $p < 0.05$. System quality explained the highest amount of variance. In contrast to our hypothesis, technical integration had a negative association with continuance intention. Due to how PLS calculates path strengths, other effects may possible have had a stronger influence and, hence, changed the algorithmic sign even though the relationship was generally positive. Therefore, we ran a single regression, but the sign remained negative. In addition to R^2 values, we also assessed predictive relevance by applying the blindfolding procedures to obtain cross-validity redundancy (Chin, 1998). The results indicated a good predictive relevance: all Q^2 were greater than 0 (Geisser, 1975).

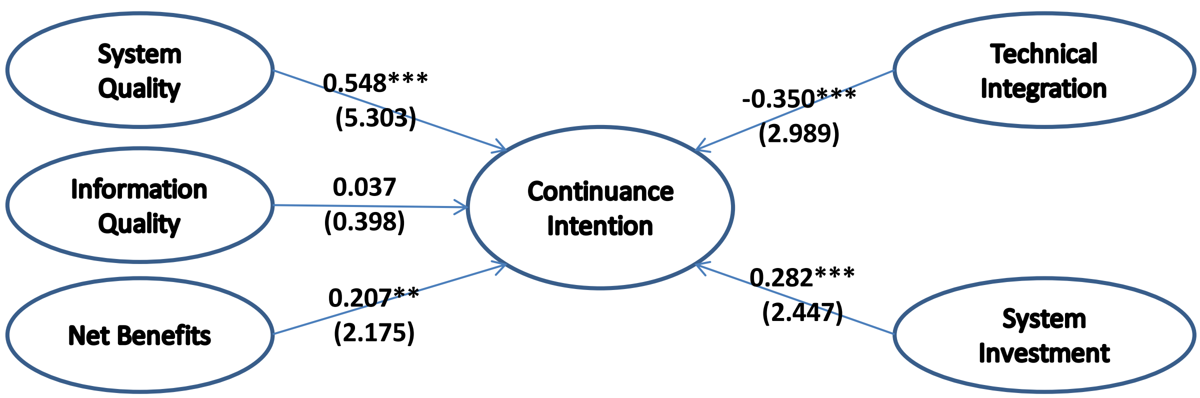

Figure 3. Results of Path Analysis (p < 0.05 | *** p < 0.01)**

We conducted a post hoc moderation analysis to see whether "time since implementation" moderated the relationship between continuance intention and system success / continuance inertia. In defining the "time since implementation" construct as a moderator, we subscribe to Baron and Kenny's (1986, p. 1174) definition of a moderator as a variable that "affects the direction and/or strength of the relationship between an independent or predictor variable and a dependent or criterion variable". The moderating effect idea relates to the premise in contingency theory that the effect of X variable on Y variable can be stronger or weaker depending on other factors, which are moderators. A moderator influences the strength of the relationship of X on Y (Henseler & Fassott, 2010). After measuring the moderation procedures that Aiken and West (1991) and Cohen and Cohen (1983) outline, we developed the simple argument that the nature and/or strength of two variables change as a function of a third variable. Our results show that the time since implementation did not affect the dependent variable (i.e., continuance) because both system success and inertia had a direct association with continuance intention.

6 Discussion

In this section, we discuss the study's contributions, practical implications, and limitations. The study makes substantial contributions to the *theoretical* discourse on dis/continuance, which the IS literature discusses sparingly. Given the substantial proliferation of cloud technology, we argue that, from a conceptual standpoint, continuance or discontinuance of cloud ES must be essential topics in the IS literature. The current trend in practice that attempts to reduce the capital IT expenses (Berman, Kesterson-Townes, Marshall, & Srivathsa, 2012; Stahl et al., 2012) and engage in IS as a service means that the client organizations need to choose between various applications (Sedera & Lokuge, 2017; Sedera et al., 2016b; Tan, Tan, Wang, & Sedera, 2016). Sedera et al. (2016a) argue that availability of applications through the cloud, minimal switching costs between applications, and the availability of the similar software features and functions mean that client organizations have accessibility to a range of applications that provide similar functions. As such, investigation into continuance and discontinuance of IS is more important than ever before.

In this study, we observed decision to continue the use of a cloud ES through system quality, information quality, net benefits, technical integration, and system investment. The five variables of the continuance model explained 55.9 percent of the model's variance. The explained variance in our model is higher than other studies that have investigated cloud continuance (e.g., Salim et al., 2015). Salim et al. (2015) investigated the adoption of cloud-based ES and found that their model only explained 35 percent of the variance of the dependent variable.

For example, system quality had the highest positive effect on the dependent variable, and system investment had the second highest, while information quality showed no significant effect. Information quality's non-significant effect is worthy of a further investigation. For example, past studies have argued that high information quality is an important factor for all system users in a company (Anthony, 1965; Gable et al., 2008). As H2 outlines, poor information quality has the potential to influence how an organization continues to use a cloud ES. Moreover, a common issue recognized in the literature identifies the loss of time that workers experience when they have to deal with information in an incomplete or unconducive format (Strong & Volkoff, 2010). We can only speculate why because there only one study has investigated the relationship (positive) between information quality and continuance at the organizational level (Fitzgerald & Russo, 2005). One possibility could be that organizations with high information quality in general across their ES take that quality for granted. Another possibility could be that information quality is generally important but that managers perceive poor information quality as relatively less important for daily business.

Similarly, we did not expect technical integration's negative influence on cloud ES continuance. We posited that organizations are less likely to discontinue when integration of the ES is high. However, our results indicate the opposite: that organizations are less likely to *continue* highly integrated enterprise systems. We have two possible explanations. First, it might be possible that high levels of technical integration may remind individuals about the cumbersome process associated with integrating the systems and, therefore, that they negatively affect their perceptions of (and satisfaction with) the system (Wixom & Todd, 2005). In turn, these negative perceptions could negatively affect continuance intentions. This argument concurs with Leonard-Barton (1988), who found that failures occurred when developers and users were unwilling to work with the system (e.g., due to high system complexity). Second, the nature of cloud ES is such that it allows one to access applications from multiple vendors rather than only one. As such, the complexity of integrating multiple vendor solutions may mean that the client organization will incur continuous spending.

Research has also shown system complexity, as one dimension of technical integration, to result in technostress for individual users (Ayyagari, Grover, & Purvis, 2011), which could negatively influence an organization's willingness to continue system use. As we predicted, system investment influenced continuance intention significantly. This finding is not surprising because research has shown organizations to perceive disinvestments as loss or waste. Organizations can handle the sunk cost phenomenon in several ways, such as involving managers who were not involved in buying decisions in replacement decisions (Benlian et al., 2012).

The study has several practical implications. First, the broader topic of cloud ES is one of the central topics in contemporary computing. The observations made in relation to the five variables have value to the practitioners. For example, the individual weightings associated with the five constructs can act as guidelines for software vendors to focus their energy on retaining clients. Client organizations can use the same weights as guideposts to periodically assess why they should retain a particular cloud ES. Moreover, using the five constructs for a longitudinal assessment will help client organizations understand the “pain points”.

Our research has some limitations that we need to highlight. First, due to our research design, individuals reported about organizational properties. Thus, one could argue that the results represent individual views rather than a shared opinion in their enterprise. Several organizational studies suffer from this possible bias, which one cannot easily assess statistically. Research could tackle this problem in two ways. First, a longitudinal study design would contribute to measuring actual behavior and, thus, legitimate the results if statistically relevant. Indeed, a cross-sectional study design cannot test the directions of hypotheses, which, in our case, we derived theoretically. Second, one should include hard data, such as percentage of uptime or cost savings, into the dataset, which would also help reduce common method variance. Even though our study explained a reasonable amount of variance, several factors could be relevant in predicting continuance intention. For instance, Benlian and Hess (2011) have found that risk awareness concerning SaaS is still present after an organization has adopted a system and can assess its actual performance. In addition, a multitude of concepts, such as environmental or institutional pressures, might also influence an organization’s decision to discontinue using existing systems. Future research needs to take additional perspectives to understand continuance on an organizational level. Third, the subsamples of our data, such as different kinds of functional ES, implementation times, or industries, might help explain structural differences. Therefore, future studies should increase generalizability by focusing on the differences between stakeholder perspectives, functional complexities of the ES, or between industries. Furthermore, one can increase the predictability of the continuance decision by carefully operationalizing variables such as IT infrastructure availability and computer sophistication (Nylén & Holmström, 2015; Yoo, Henfridsson, & Lyytinen, 2010). Researchers have suggested that both variables have a strong association with contemporary technology adoption.

The results show that the process in which companies decide to continue using a system is more complex than an individual behavioral mechanism. According to TPB, researchers should interpret net benefits as behavioral belief similar to perceived usefulness, whereas they should interpret system quality and information quality as external variables (Wixom & Todd, 2005). In other words, as organizations implement information systems to support higher goals, they are usually only a means to an end (e.g., to achieve certain benefits). Therefore, if one analyzed continuance intention from a behavioral stance, net benefits should have the highest influence on continuance intention because it represents the main reason why organizations implement a system.

The study also has interesting implications for further research on adoption, continuance, and discontinuance. As our findings suggest, factors from discontinuance research also influence the central concept of continuance, even at an early stage of adoption. Undoubtedly, there are numerous differences between factors that influence whether organizations decide to use or replace a system at different stages of the software lifecycle. Further research needs to clarify how these different adoption phases relate to one another. Finally, our study makes an important contribution in understanding the role of IS success as post-adoption variables in the organizational level continuance of information systems where, surprisingly, little research exists (e.g., Petter et al., 2008; Urbach et al., 2009).

Our study has several implications for practice as well. First, for client organizations, our study findings highlight the importance of focusing on a system’s core aspects: the quality of the system and the net benefits that the system facilitates. The notions related to ease of use, ease of learning, system requirements, and security have prominence here. Similarly, net benefits are important to companies using cloud-based ES. Companies that use or intend to use cloud-based ES must focus on the fundamentals such as system quality and net benefits. Second, for software vendors, our findings show that organizations are less sensitive to the quality of the information from the system. It is possible that the quality of information may be something that organizations consider as a given rather than something that they struggle to attain. Similarly, though reasonably priced compared to the on-premise solutions, client organizations are still sensitive to the cost of cloud-based ES solutions.

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Appendix

Table A1. The Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. deviation
System quality	115	3.17	7.25	5.15	0.75
Information quality	115	2.69	7.88	5.20	0.99
Net benefits	115	2.13	8.00	5.50	0.91
Technical integration	115	1.00	8.00	4.39	1.68
System investment	115	1.00	8.00	4.64	1.60
Continuance intention	115	2.24	7.13	4.85	1.04

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